

**WHAT IS CLAIMED IS:**

1. A chemical reactor comprising:

a sheath flow forming block which forms a plurality of alternating sheath flows with two mutually unmixable fluids;

5 a plurality of inlet ports through which said two fluids flow into said sheath flow forming block;

a contraction zone which simultaneously contracts a plurality of sheath flows formed in said sheath flow forming block; and

10 a reaction flow channel which is connected with said contraction zone and is smaller in width than said sheath flow forming block.

2. The chemical reactor as claimed in Claim 1, wherein, in said  
15 sheath flow forming block, a plurality of inlet ports for one fluid is located in a flow channel for the other fluid.

3. The chemical reactor as claimed in Claim 1, wherein a buffer tank with a flow channel sectional area larger than the flow  
20 channel sectional area of said sheath flow forming block is provided upstream of said sheath flow forming block.

4. The chemical reactor as claimed in Claim 1, wherein a rectifying channel is provided upstream of said contraction  
25 zone in each of flow channels for said two fluids.

5. The chemical reactor as claimed in Claim 1, wherein a plurality of said sheath flow forming blocks are arranged in parallel.

5 6. The chemical reactor as claimed in Claim 5, wherein the lengths of the flow channels from said plural sheath flow forming blocks to an area of convergence at the downstream are equal.

7. The chemical reactor as claimed in Claim 1, wherein said  
10 reaction flow channel located downstream of said sheath flow forming block has a profile formed with a straight line and a smooth curve.

8. The chemical reactor as claimed in Claim 1, wherein,  
15 downstream of said reaction flow channel through which two kinds of fluids having an interface flow, a thin flow channel with a sectional area smaller than the sectional area of said reaction flow channel is provided and a thick flow channel with a sectional area larger than the sectional area of said reaction flow channel  
20 is provided downstream of said thin flow channel, and two outlet ports which differ in height vertically are provided downstream of said thick flow channel.

9. The chemical reactor as claimed in Claim 8, wherein an area  
25 adjacent to at least one of said outlet ports is surface-treated.

10. The chemical reactor as claimed in Claim 1, wherein,  
downstream of said reaction flow channel in which two kinds  
of liquids having an interface flow, one outlet port is provided  
5 for each liquid and a separation film having a plurality of  
holes with a sectional area of  $0.01 \text{ mm}^2$  or less is provided  
between one outlet port and said reaction flow channel.

11. The chemical reactor as claimed in Claim 1, wherein,  
10 downstream of said reaction flow channel in which two kinds  
of liquids having an interface flow, one outlet port is provided  
for each liquid, and a separation film having a plurality of  
holes with a sectional area of  $1 \text{ mm}^2$  or less is provided between  
one outlet port and said reaction flow channel, and the inside  
15 of said holes and an area adjacent to said holes on a flow channel  
surface in which said holes are made are surface-treated.

12. The chemical reactor as claimed in Claim 1, wherein,  
downstream of said reaction flow channel in which two kinds  
20 of liquids having an interface flow, one outlet port is provided  
for each liquid and one hole with a sectional area of  $10 \text{ mm}^2$   
or less is provided between one outlet port and said reaction  
flow channel.

25 13. The chemical reactor as claimed in Claim 1, wherein,

downstream of said reaction flow channel in which two kinds of liquids having an interface flow, one outlet port is provided for each liquid, and one hole with a sectional area of 100 mm<sup>2</sup> or less is provided between one outlet port and said reaction  
5 flow channel, and the inside of said holes and an area adjacent to said hole on a flow channel surface in which said holes are made are surface-treated.

14. The chemical reactor as claimed in Claim 13, wherein an  
10 area adjacent to said hole on one outlet side is lipophilic-finished or water-repellent finished and an area adjacent to said hole on the other outlet side is hydrophilic-finished.

15 15. The chemical reactor as claimed in Claim 1, wherein the above components are manufactured by microfabrication technology.

16. A separate apparatus comprising:

20 a flow channel in which plurality of liquids having an interface flows;

first outlet port being provided for at least one of said liquids;

a separation portion having holes being provided between  
25 said first outlet port and said flow channel; and

the inside of said hole or an area adjacent to said holes on a flow channel surface in which said holes are made or both of them is surface-treated.

5 17. The separate apparatus as claimed in claim (1), wherein, the inside of said hole or an area adjacent to said holes on a flow channel surface in which said holes are made or both of them is lipophilic-finished or water repellent finished.

10 18. The separate apparatus as claimed in claim (1), wherein, the inside of said hole or an area adjacent to said holes on a flow channel surface in which said holes are made or both of them is hydrophilic-finished.